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Retrieving aggregate information from option volume

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ABSTRACT

This paper studies how to retrieve aggregate information from the trading volume of Taiwan composite stock index options (TXO) with better quality by modifying the two option-information aggregation methods introduced in Holowczak et al. (2014). To study an emerging market such as the Taiwan options market, whose major players are retail investors, we take into consideration the retail participation rate and the trading distribution across moneyness, in addition to factors such as option market depth, liquidity, and investors' trading purposes, as discussed in Holowczak et al. (2014). Retail investors, who are generally less well-informed, have traded mainly nearby TXO options with expirations of less than one month. Therefore, the weights of nearby contracts should be reduced. Furthermore, both institutions and retail investors have traded more at near-the-money TXO options, and consequently the weights of in-the-money options and out-of-the-money options should be discounted to accommodate the uneven option trading across moneyness. In addition, we find that there is a dichotomy in the information roles of out-of-the-money options: the information content of their trades is higher (lower) when market volatility increases (decreases). Based on this finding, we establish a VIX-adjusted put-call ratio which increases (decreases) the weight of out-of-the-money options when the market VIX is larger (smaller) than its previous average level. Our model, as revised for an emerging market such as the Taiwan options market, has outperformed in explaining contemporaneous price changes and has shown very good predictive ability for large downside market moves.

1. Introduction

This paper focuses on the differential information roles of options of different strikes and expirations. Option trading conveys information about the price changes of the underlying stock because of the presence of informed trading. However, informed traders

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seldom randomly choose an option contract to realize their information advantage. Their choices must account for market depth, liquidity, as well as leverage inherent in options (Holowczak, Hu, and Wu, 2014). This fact further creates the challenge of how to effectively aggregate information from the trading volume of different options.

An economically appealing approach is the mechanism proposed by Holowczak et al. (2014). They use options on QQQQ, the NASDAQ 100 tracking index, and introduce maturity discount and strike-price discount methods in which nearby options with maturities of one month or less and near-the-money (ATM) options have a weight of one, while the weights of options with increasing maturity and increasing standardized moneyness decline exponentially with a constant decay rate. Their idea is simple. To mitigate against market impact and to reduce trading costs, informed traders are prone to choose most actively traded options with short maturities and ATM options. In the meantime, they also consider investors' trading purpose, as deep out-of-the-money (DOTM) options and options with very long maturities are often used to hedge specific risk exposure, thus containing little directional information. Nevertheless, the two categories of options deserve the least weight.

This paper attempts to retrieve aggregate information from Taiwan composite stock index options (TXO) transactions. While Pan and Poteshman (2006) argue that it seems less likely that investors would have superior information at the market level in developed options markets, information asymmetry is more prevalent in emerging index options markets. Hsieh and He (2014) and Lee and Wang (2016) both find that TXO trading volume contains information about index price changes. Lin, Tsai, Zheng, and Qiao (2017) also show that TXO trading conveys Taiwan composite stock index futures (TX) price information. Chang, Hsieh, and Lai (2009), Chang, Hsieh, and Wang (2015) and Lin et al. (2017) further conclude that foreign institutions are better market-wide informed in the TXO market. Moreover, Ahn, Kang, and Ryu (2008) find that one-third of the spread in KOSPI 200 options is an information asymmetry cost, and the adverse selection component increases with option delta.¹

We propose two additional considerations, the retail participation rate and the trading distribution across moneyness, which contribute to enhancing the effectiveness of the two aforementioned aggregation methods (maturity discount and strike-price discount methods) when applied to the TXO market. First, retail trading, which is often considered to be noise trading², accounts for nearly 60 percent of trading volume in the sample period. Although all types of investors tend to trade more nearby options with maturities of one month or shorter, this pattern seems to be extremely strong for retail investors. Han and Kumar (2013) find that stocks with high retail participation rates are likely to be overpriced, thus exhibiting a significantly negative alpha. On the other hand, intermediate horizon options are most actively traded by foreign and domestic institutional investors. Given that the concentration of informed traders is closely associated with the information content of option trading (Easley, O'Hara, & Srinivas, 1998; Pan & Poteshman, 2006), we conjecture that assigning the maximum weight of one to the intermediate horizon options, rather than nearby ones, would generate superior performance when applying the maturity discount method to study the TXO market.

Second, according to the liquidity hypothesis, the evenness of investors' allocation of their option trades across moneyness determines their relative weights in aggregation. In the weighting scheme of Holowczak et al. (2014), ATM options have a weight of one, and the weights of in-the-money (ITM) and out-of-the-money (OTM) options decline exponentially at a constant weight decay rate of 1/2 with increasing standardized moneyness in absolute magnitude. Investors in the TXO market distribute their trades unevenly, mostly concentrating at ATM options. If we adopt the same decay rate of 1/2, options with moneyness equal to 1.10 would have a weight of 0.9955, which is less than the maximum weight of one by only 0.45%, according to the strike-price discount method. However, their trading volume accounts for less than 10% of that for ATM options. These contrasting results imply that the weight decay rate of 1/2 overestimates the information roles of ITM and OTM options. Mathematically, a larger decay rate is called for in order to accommodate the uneven option trading across moneyness when applying the strike-price discount method to the TXO market.

In addition to the two aforementioned considerations, we argue that volatility also has an impact on strike-price discount method. Our argument stems from the numerous empirical findings that provide supporting evidence that informed investors behave differently in bear markets (Chan, Chang, & Lung, 2009). In the TXO market, the trading behavior of institutional investors supports our claim. The proportion of OTM and deep OTM options trades increased by 12.28% and 22.63% for foreign institutions and domestic institutions, respectively, during a downward trending period with the VIX, an indicator of market volatility, exceeding 25. Moreover, the overall market trading volume for OTM and DOTM options grew from 40.43% to 64.68%, exceeding that for ATM options, which indicates that OTM options were most actively traded in this period. In addition, OTM options provide investors with higher leverage. These two factors together make OTM options more appealing to informed traders. Therefore, their corresponding information roles should be augmented when applying the strike-price discount method during a downward trending period.

We construct put-call ratios using the maturity discount and strike-price discount methods, respectively, with open-buy TXO trade data which is initiated by a buyer to open a new option position. We focus on both contemporaneous relationships and the protracted effect of options trading activity on price changes in the underlying index, following Chan, Chung, and Fong (2002), Schlag and Stoll (2005), and Holowczak et al. (2014). Empirically, a significant price reversal may signal liquidity or hedging effects rather than informed trading. As our study involves parameter optimizing, we further partition our entire sample into two parts with a ratio of 3:1 and separately conduct in-sample and out-of-sample tests to examine whether our results are robust across different periods.

Our three findings provide insights into the role of retail trading, as well as how investors allocate option trades across moneyness and volatility in retrieving aggregate information from option volume. First, the maturity discounted put-call ratios with intermediate horizon options, which has a lower retail participation rate, rather than nearby options assigned a weight of one capture the strongest contemporaneous impact; this result is robust for out-of-sample tests. Although this finding is inconsistent with Holowczak et al. (2014),

¹ See also Chen, Chung, and Yuan (2014) and Atilgan, Demirtas, and Simsek (2016).

² See, for example, Chang et al. (2009) and Han, Lee, and Liu (2009).

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